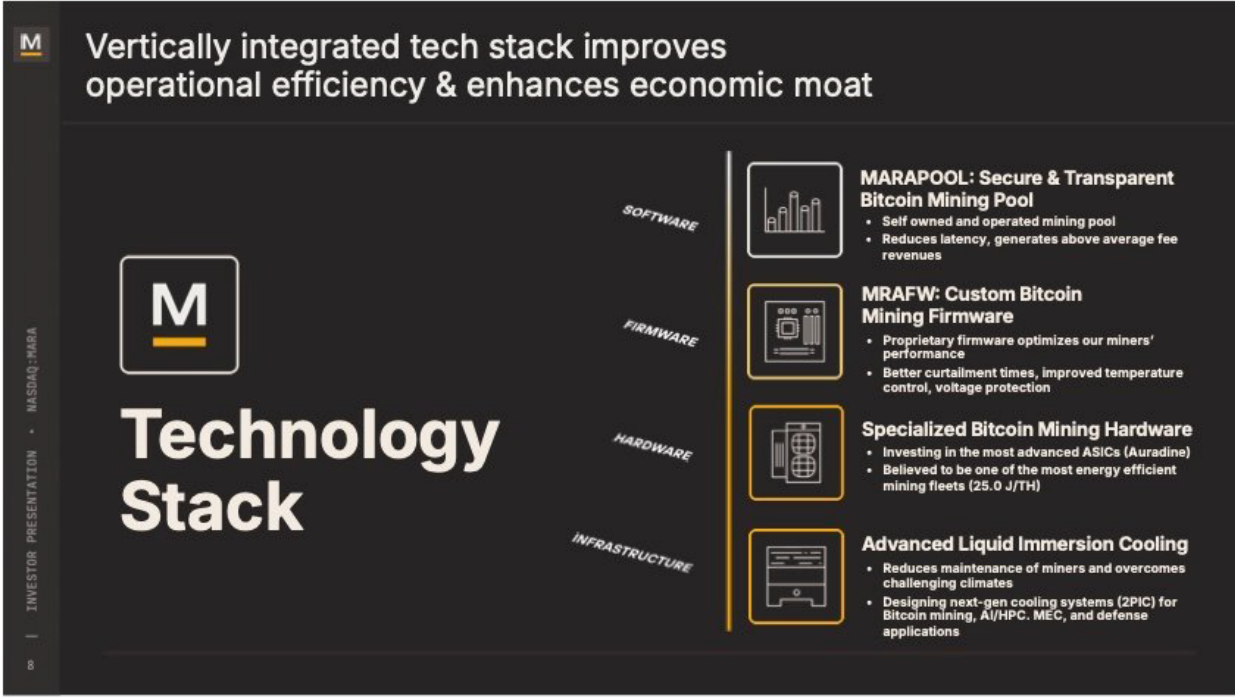


# Exhibit 8

**Exhibit 8: U.S. Patent No. 10,284,370**

Claim 1	Exemplary Evidence of Infringement
<p><b>1[pre]</b> A method performed by a hardware processor of a computing device, comprising:</p>	<p>MARA Holdings, Inc. (hereinafter “MARA”) performs a method (e.g., verification of Bitcoin transactions) using a hardware processor of a computing device. <i>See, e.g.:</i></p> <p>“Marathon is a digital asset technology company that is principally engaged in producing or <b><u>‘mining’ digital assets with a focus on the Bitcoin ecosystem</u></b> ... <b><u>The term ‘Bitcoin’ with a capital ‘B’ is used to denote the Bitcoin protocol</u></b> which implements a highly available, public, permanent, and decentralized ledger.” (Emphasis added)</p> <p><i>See, e.g.,</i> MARA Holdings, Inc., Annual report pursuant to Section 13 and 15(d), (Form 10-K/A), at F-9, filed May 24, 2024, available at <a href="https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm">https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm</a>.</p> <p>“As Operator, the Company <b><u>provides transaction verification services</u></b> to the transaction requester, in addition to the Bitcoin network. <b><u>Transaction verification services are an output of the Company’s ordinary activities</u></b>; therefore, the Company views the transaction requester as a customer and <b><u>recognizes the transaction fees as revenue from contracts with customers under ASC 606</u></b>. The Bitcoin network is not an entity such that it may not meet the definition of a customer; however, the Company has concluded that <b><u>it is appropriate to apply ASC 606 by analogy to block rewards earned from the Bitcoin network</u></b>.”(Emphasis added).</p> <p><i>See, e.g.,</i> MARA Holdings., Inc., Quarterly report, (Form 10-Q), at Note 4 – Revenues, filed November 12, 2024, available at <a href="https://www.sec.gov/ix?doc=/Archives/edgar/data/0001507605/000162828024047148/mara-20240930.htm">https://www.sec.gov/ix?doc=/Archives/edgar/data/0001507605/000162828024047148/mara-20240930.htm</a>.</p> <p>“The Bitcoin protocol is the technology that enables Bitcoin to function as a decentralized, peer-to-peer payment network. This open-source software, which sets the rules and processes that govern the Bitcoin network, is maintained and improved by a community of developers around the world known as Bitcoin Core developers ... ‘At Marathon, we have historically focused on supporting Bitcoin by adding hash rate, which helps secure the network, and now, we are supporting those who</p>

Claim 1	Exemplary Evidence of Infringement
	<p>maintain <b><u>the open-source protocol on which we all depend</u></b> by contributing to Brink,’ said Fred Thiel, Marathon’s chairman and CEO.” (Emphasis added)</p> <p><i>See, e.g.,</i> Marathon Holdings Collaborates with Brink To Raise Up to \$1 Million To Support Bitcoin Core Developers, GlobeNewswire (May 18, 2023), available at <a href="https://www.globenewswire.com/news-release/2023/05/18/2672276/0/en/Marathon-Digital-Holdings-Collaborates-with-Brink-To-Raise-Up-to-1-Million-To-Support-Bitcoin-Core-Developers.html">https://www.globenewswire.com/news-release/2023/05/18/2672276/0/en/Marathon-Digital-Holdings-Collaborates-with-Brink-To-Raise-Up-to-1-Million-To-Support-Bitcoin-Core-Developers.html</a>.</p> <p>For example, MARA performs a method by a hardware processor (<i>e.g.</i>, ASIC, GPU, etc.) of a computing device (<i>e.g.</i>, a node or a miner) under the Bitcoin protocol. <i>See, e.g.</i>:</p> <p>“Bitcoin is a decentralized digital currency that enables instant payments to anyone, anywhere in the world. Bitcoin uses peer-to-peer technology to operate with no central authority: transaction management and money issuance are carried out collectively by the network.”</p> <p><i>See, e.g.</i>, Welcome to the Bitcoin Wiki, <a href="https://en.bitcoin.it/wiki/Main_Page">https://en.bitcoin.it/wiki/Main_Page</a>.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Full nodes are the ones that really support and secure the Bitcoin blockchain, and they are indispensable to the network. Full nodes (or fully validating nodes) are responsible for verifying transactions and <b><u>blocks</u></b> according to the rules of the Bitcoin protocol. And since the network is distributed, the rules are enforced by Bitcoin’s <b><u>consensus algorithm</u></b>.</p> </div> <p><i>See, e.g.</i>, Node, <a href="https://academy.binance.com/en/glossary/node">https://academy.binance.com/en/glossary/node</a>.</p>

Claim 1	Exemplary Evidence of Infringement
	<p>In the world of cryptocurrencies, the term ASIC is widely used to refer to the specialized hardware that are being developed and regularly improved by companies such as Bitmain and Halong Mining. These hardware are designed with the sole intention of mining <u>Bitcoin</u> (or other <u>cryptocurrencies</u>). There are some coins that cannot be effectively mined using ASIC miners and, as such, may be referred to as <u>ASIC-resistant</u> cryptocurrencies.</p> <p>See, e.g., Application-Specific Integrated Circuit (ASIC), <a href="https://academy.binance.com/en/glossary/application-specific-integrated-circuit">https://academy.binance.com/en/glossary/application-specific-integrated-circuit</a>.</p> 

Claim 1	Exemplary Evidence of Infringement
	<p><i>See, e.g.,</i> <a href="https://d1io3yog0oux5.cloudfront.net/_2dc31b1794f998d5238d31da962c40f6/marathondh/db/417/7503/pdf/24Q3-INVESTOR+PRESENTATION.pdf">https://d1io3yog0oux5.cloudfront.net/_2dc31b1794f998d5238d31da962c40f6/marathondh/db/417/7503/pdf/24Q3-INVESTOR+PRESENTATION.pdf</a>.</p> <p>MARA performs the method using a hardware processor of a computing device. <i>See, e.g.:</i></p> <p>“Our core business is bitcoin mining, and we produce, or ‘mine,’ bitcoin using one of the industry’s largest and most energy-efficient fleets of <b>specialized computers</b> while providing dispatchable compute as an optionality to the electric grid operators to balance electric demands on the grid.” (Emphasis added)</p> <p><i>See, e.g.,</i> MARA Holdings, Inc., Form 10-K/A, at 6, filed March 3, 2025, available at <a href="https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm">https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm</a>.</p> <p>“Over the past three years, digital asset mining operations have evolved from individual users mining with <b>computer processors, graphics processing units and first-generation mining rigs</b>. New processing power brought onto the digital asset networks is predominantly added by professionalized mining operations, which may use <b>proprietary hardware or sophisticated machines</b>.” (Emphasis added)</p> <p><i>See, e.g.,</i> MARA Holdings, Inc., Form 10-K/A, at 21, filed March 3, 2025, available at <a href="https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm">https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm</a>.</p> <p>“As of December 31, 2024, we operated approximately 400,000 bitcoin mining <b>ASICs</b>, capable of producing 53.2 EH/s with an efficiency of 19.2 joules per terahash, which is among the most efficient in the industry.” (Emphasis added)</p> <p><i>See, e.g.,</i> MARA Holdings, Inc., Form 10-K/A, at 21, filed March 3, 2025, available at <a href="https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm">https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm</a>.</p>

Claim 1	Exemplary Evidence of Infringement
	<p>“Miners, which operate <b><u>specialized hardware, known as bitcoin mining rigs or application-specific integrated circuits (“ASICs”)</u></b>, then compete to process these unconfirmed transactions into a ‘block.’” (Emphasis added)</p> <p><i>See, e.g.,</i> MARA Holdings, Inc., Form 10-K/A, at 6, filed March 3, 2025, available at <a href="https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm">https://ir.mara.com/sec-filings/all-sec-filings/content/0001628280-24-025261/mara-20231231.htm</a>.</p>
<p><b>1[a]</b> receiving, by a receiver of the computing device and through a network, an electronic message including a signature, wherein the electronic message omits a public key of a signer, and the signature comprises a signature on the electronic message M;</p>	<p>MARA’s miners receive, by a receiver of the computing device and through a network (<i>e.g.</i>, peer-to-peer network), an electronic message including a signature, wherein the electronic message omits a public key of a signer (<i>e.g.</i>, Bitcoin transferor), and the signature comprises a signature on the electronic message M. <i>See, e.g.</i>:</p> <div data-bbox="625 711 1875 748" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>The Signature is a base64-encoded ECDSA signature that, when decoded, with fields described in the next section.</p> </div> <div data-bbox="800 781 1696 1122" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b>3 Algorithm for signing and verifying messages</b></p> <p>3.1 Definitions used in the algorithms</p> <p>3.2 Constants</p> <p>3.3 Message signing method</p> <p>3.3.1 ECDSA signing, with P2PKH uncompressed addresses</p> <p>3.3.2 ECDSA signing, with P2PKH compressed addresses</p> <p>3.3.3 ECDSA signing, with P2WPKH-P2SH compressed addresses</p> <p>3.3.4 ECDSA signing, with P2WPKH compressed addresses</p> </div> <div data-bbox="625 1138 1875 1382" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b>Algorithm for signing and verifying messages</b></p> <p>Below is a list of instructions for creating a BIP137-compliant message signing and verification algorithm.</p> <p>It is not required, but you should strip trailing newlines from the message before signing it, because some clients cannot process messages that contain trailing newlines.</p> <p>Below is a list of steps for signing and verifying a message, for each supported address type.</p> </div> <p><i>See, e.g.,</i> Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p>

Claim 1	Exemplary Evidence of Infringement
	<p><b><u>“Bitcoin signed messages have three parts, which are the Message, Address, and Signature.</u></b>  The message is the actual message text - all kinds of text is supported, but it is recommended to avoid using non-ASCII characters in the signature because they might be encoded in different character sets, preventing signature verification from succeeding.</p> <p>The address is a legacy, nested segwit, or native segwit address. Message signing from legacy addresses was added by Satoshi himself and therefore does not have a BIP. <b><u>Message signing from segwit addresses has been added by BIP137 ... The Signature is a base64-encoded ECDSA signature</u></b> that, when decoded, with fields described in the next section.” (Emphasis added)</p> <p><i>See, e.g.,</i> Message Signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p> <p>“This document describes a signature format for <b><u>signing messages with Bitcoin private keys.</u></b></p> <p>The specification is intended to describe the standard for signatures of messages that can be signed and verified between different clients that exist in the field today.” (Emphasis added)</p> <p><i>See, e.g.,</i> Bitcoin BIP137, <a href="https://github.com/bitcoin/bips/blob/master/bip-0137.mediawiki">https://github.com/bitcoin/bips/blob/master/bip-0137.mediawiki</a>.</p> <p>For example, the electronic message includes a hash of the ECDSA public key instead of the public key itself. <i>See, e.g.:</i></p>

Claim 1	Exemplary Evidence of Infringement
	<p><b>Addresses</b></p> <p>A bitcoin address is in fact the hash of a ECDSA public key, computed this way:</p> <pre> Version = 1 byte of 0 (zero); on the test network, this is 1 byte of 111 Key hash = Version concatenated with RIPEMD-160(SHA-256(public key)) Checksum = 1st 4 bytes of SHA-256(SHA-256(Key hash)) Bitcoin Address = Base58Encode(Key hash concatenated with Checksum) </pre> <p>See, e.g., <a href="https://en.bitcoin.it/wiki/Protocol_documentation#Addresses">https://en.bitcoin.it/wiki/Protocol_documentation#Addresses</a>.</p>
<p><b>1[b]</b> receiving, by the receiver of the computing device and through the network, a first elliptic curve point associated with a signature component from the signer, wherein the signature component comprises a first signature component r, the signature includes the first signature component r and a second signature component s, and the first elliptic curve point comprises an elliptic curve point R;</p>	<p>MARA's miners receive a first elliptic curve point (e.g., R) associated with a signature component (e.g., r) from the signer, wherein the signature component comprises a first signature component r (e.g., the r-value) and a second signature component s (e.g., the s-value), and the first elliptic curve point comprises an elliptic curve point R. See, e.g.:</p>



Claim 1	Exemplary Evidence of Infringement
	<div data-bbox="615 235 1875 553"> <p><b>Detailed specification of the message signature</b></p> <p>ECDSA signatures generate a 32-byte r-value and a 32-byte s-value (see <a href="#">Elliptic Curve Digital Signature Algorithm</a>), which collectively represent the signature. Bitcoin signatures have the r and s values mentioned above, and a 1-byte header. Therefore, the size of a signature is 65 bytes.</p> <p>The header is used to specify information about the signature. It can be thought of as a bitmask with each bit in this byte having a meaning. The serialization format of a Bitcoin signature is as follows:</p> <p>(1 byte for header data)(32 bytes for r-value)(32 bytes for s-value)</p> </div> <div data-bbox="615 570 1875 911"> <p><b>Message verification method</b></p> <p>It takes the following parameters:</p> <ul style="list-style-type: none"> <li>• The message (Message)</li> <li>• The address (Address)</li> <li>• An ECDSA signature (Signature)</li> </ul> <p>The Header byte in the signature shall dictate the verification algorithm that is used.</p> <p>Upon verification success, you should display a status message similar to: "Genuine signed message from address &lt;Address&gt;".</p> </div> <p><i>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</i></p> <p>For example, MARA's miners receive a first elliptic curve point (<i>e.g.</i>, R) associated with a signature component (<i>e.g.</i>, r) from the signer, wherein the signature component comprises a first signature component r (<i>e.g.</i>, the r-value) and a second signature component s (<i>e.g.</i>, the s-value), and the first elliptic curve point comprises an elliptic curve point R. For example, <math>R=(x,y)</math> where <math>x=r</math> or <math>x=r+n</math>.  <i>See, e.g.:</i></p>

Claim 1	Exemplary Evidence of Infringement
	<p><b>ECDSA verification, P2WPKH compressed address</b></p> <ol style="list-style-type: none"> <li>1. Set <math>r = \text{DecodedSignature}[1:33]</math>. If <math>r \geq n</math> or <math>r == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>2. Set <math>s = \text{DecodedSignature}[33:65]</math>. If <math>s \geq n</math> or <math>s == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>3. Set <math>z = \text{SHA256}(\text{Message})</math></li> <li>4. Set <math>\text{recID} = \text{Header AND } 0x3</math></li> <li>5. If <math>\text{recID AND } 0x2 == 0</math>, set <math>x = r</math>, else set <math>x = r+n</math>.</li> <li>6. Set <math>x = (x^3 + 7) \bmod p</math></li> <li>7. Set <math>y = x^{(p+1)/4} \bmod p</math></li> <li>8. Calculate the correct parity of <math>y</math> using the 'recID': <ul style="list-style-type: none"> <li>• If <math>(\text{is\_even}(\text{beta}) \text{ and } \text{is\_odd}(\text{recID}))</math> or <math>(\text{is\_odd}(\text{beta}) \text{ and } \text{is\_even}(\text{recID}))</math>, set <math>y = p-y</math>.</li> </ul> </li> <li>9. Set <math>R = (x, y)</math></li> <li>10. Set <math>e = (-\text{int}(z)) \% n</math></li> <li>11. Set <math>\text{PublicKey} = (R*s + G*e) * \text{modinv}(r, n)</math></li> <li>12. If <math>\text{is\_even}(y)</math>, compute <math>\text{EncodedPublicKey} = "02" \parallel \text{hex}(x)</math>. Else, compute <math>\text{EncodedPublicKey} = "03" \parallel \text{hex}(x)</math></li> <li>13. Compute <math>\text{AddressHash} = \text{RIPEMD160}(\text{SHA256}(\text{EncodedPublicKey}))</math></li> <li>14. Compute <math>\text{DerivedAddress} = \text{Bech32}("bc", 0, \text{AddressHash})</math></li> <li>15. If <math>\text{DerivedAddress} == \text{Address}</math>, succeed verification. Else fail verification with an error similar to "Wrong address for signature".</li> </ol> <p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p>
<p><b>1[c]</b> recovering, by the hardware processor of the computing device, the omitted public key of the signer based on the received first elliptic curve point and the received signature, wherein the public key comprises a second elliptic curve point in an elliptic curve group different from the first elliptic curve point, wherein the elliptic curve</p>	<p>MARA's miners recover the omitted public key (e.g., PublicKey, Q) of the signer based on the received first elliptic curve point (e.g., R) and the received signature (e.g., (r,s)). See, e.g.:</p>

Claim 1	Exemplary Evidence of Infringement
<p>group includes the first and second elliptic curve points, wherein the second elliptic curve point comprises an elliptic curve point Q, wherein recovering the omitted public key of the signer comprises computing <math>Q=r-1(sR-eG)</math>, wherein G comprises a generator of an elliptic curve group that includes the elliptic curve point R and the elliptic curve point Q, and wherein e is a hash value computed from the electronic message M; and</p>	<p><b>ECDSA verification, P2WPKH compressed address</b></p> <ol style="list-style-type: none"> <li>1. Set <math>r = \text{DecodedSignature}[1:33]</math>. If <math>r \geq n</math> or <math>r == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>2. Set <math>s = \text{DecodedSignature}[33:65]</math>. If <math>s \geq n</math> or <math>s == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>3. Set <math>z = \text{SHA256}(\text{Message})</math></li> <li>4. Set <math>\text{recID} = \text{Header AND } 0x3</math></li> <li>5. If <math>\text{recID AND } 0x2 == 0</math>, set <math>x = r</math>, else set <math>x = r+n</math>.</li> <li>6. Set <math>x = (x^3 + 7) \bmod p</math></li> <li>7. Set <math>y = x^{(p+1)/4} \bmod p</math></li> <li>8. Calculate the correct parity of y using the 'recID': <ul style="list-style-type: none"> <li>• If <math>(\text{is\_even}(\text{beta}) \text{ and } \text{is\_odd}(\text{recID}))</math> or <math>(\text{is\_odd}(\text{beta}) \text{ and } \text{is\_even}(\text{recID}))</math>, set <math>y = p-y</math>.</li> </ul> </li> <li>9. Set <math>R = (x, y)</math></li> <li>10. Set <math>e = (-\text{int}(z)) \% n</math></li> <li>11. Set <math>\text{PublicKey} = (R*s + G*e) * \text{modinv}(r, n)</math></li> <li>12. If <math>\text{is\_even}(y)</math>, compute <math>\text{EncodedPublicKey} = "02" \parallel \text{hex}(x)</math>. Else, compute <math>\text{EncodedPublicKey} = "03" \parallel \text{hex}(x)</math></li> <li>13. Compute <math>\text{AddressHash} = \text{RIPEMD160}(\text{SHA256}(\text{EncodedPublicKey}))</math></li> <li>14. Compute <math>\text{DerivedAddress} = \text{Bech32}("bc", 0, \text{AddressHash})</math></li> <li>15. If <math>\text{DerivedAddress} == \text{Address}</math>, succeed verification. Else fail verification with an error similar to "Wrong address for signature".</li> </ol> <p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p> <p>The public key (e.g., PublicKey) comprises a second elliptic curve point (e.g., Q) in an elliptic curve group different from the first elliptic curve point (e.g., R), wherein the elliptic curve group includes the first and second elliptic curve points. For example, points R and Q belong to the same elliptic curve group. See, e.g.:</p>

Claim 1	Exemplary Evidence of Infringement
	<p><b>ECDSA verification, P2WPKH compressed address</b></p> <ol style="list-style-type: none"> <li>1. Set <math>r = \text{DecodedSignature}[1:33]</math>. If <math>r \geq n</math> or <math>r == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>2. Set <math>s = \text{DecodedSignature}[33:65]</math>. If <math>s \geq n</math> or <math>s == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>3. Set <math>z = \text{SHA256}(\text{Message})</math></li> <li>4. Set <math>\text{recID} = \text{Header AND } 0x3</math></li> <li>5. If <math>\text{recID AND } 0x2 == 0</math>, set <math>x = r</math>, else set <math>x = r+n</math>.</li> <li>6. Set <math>x = (x^3 + 7) \bmod p</math></li> <li>7. Set <math>y = x^{(p+1)/4} \bmod p</math></li> <li>8. Calculate the correct parity of <math>y</math> using the 'recID': <ul style="list-style-type: none"> <li>• If <math>(\text{is\_even}(\text{beta}) \text{ and } \text{is\_odd}(\text{recID}))</math> or <math>(\text{is\_odd}(\text{beta}) \text{ and } \text{is\_even}(\text{recID}))</math>, set <math>y = p-y</math>.</li> </ul> </li> <li>9. Set <math>R = (x, y)</math></li> <li>10. Set <math>e = (-\text{int}(z)) \% n</math></li> <li>11. Set <math>\text{PublicKey} = (R*s + G*e) * \text{modinv}(r, n)</math></li> <li>12. If <math>\text{is\_even}(y)</math>, compute <math>\text{EncodedPublicKey} = "02" \parallel \text{hex}(x)</math>. Else, compute <math>\text{EncodedPublicKey} = "03" \parallel \text{hex}(x)</math></li> <li>13. Compute <math>\text{AddressHash} = \text{RIPEMD160}(\text{SHA256}(\text{EncodedPublicKey}))</math></li> <li>14. Compute <math>\text{DerivedAddress} = \text{Bech32}("bc", 0, \text{AddressHash})</math></li> <li>15. If <math>\text{DerivedAddress} == \text{Address}</math>, succeed verification. Else fail verification with an error similar to "Wrong address for signature".</li> </ol> <p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p> <p>The second elliptic curve point comprises an elliptic curve point <math>Q</math> (e.g., <math>\text{PublicKey}</math>), wherein recovering the omitted public key of the signer comprises computing <math>Q=r-1(sR-eG)</math>, wherein <math>G</math> comprises a generator of an elliptic curve group that includes the elliptic curve point <math>R</math> and the elliptic curve point <math>Q</math>, and wherein <math>e</math> is a hash value computed from the electronic message <math>M</math>. See, e.g.:</p>

Claim 1	Exemplary Evidence of Infringement
	<p><b>ECDSA verification, P2WPKH compressed address</b></p> <ol style="list-style-type: none"> <li>1. Set <math>r = \text{DecodedSignature}[1:33]</math>. If <math>r \geq n</math> or <math>r == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>2. Set <math>s = \text{DecodedSignature}[33:65]</math>. If <math>s \geq n</math> or <math>s == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>3. Set <math>z = \text{SHA256}(\text{Message})</math></li> <li>4. Set <math>\text{recID} = \text{Header AND } 0x3</math></li> <li>5. If <math>\text{recID AND } 0x2 == 0</math>, set <math>x = r</math>, else set <math>x = r+n</math>.</li> <li>6. Set <math>x = (x^3 + 7) \bmod p</math></li> <li>7. Set <math>y = x^{(p+1)/4} \bmod p</math></li> <li>8. Calculate the correct parity of <math>y</math> using the 'recID': <ul style="list-style-type: none"> <li>• If <math>(\text{is\_even}(\text{beta}) \text{ and } \text{is\_odd}(\text{recID}))</math> or <math>(\text{is\_odd}(\text{beta}) \text{ and } \text{is\_even}(\text{recID}))</math>, set <math>y = p-y</math>.</li> </ul> </li> <li>9. Set <math>R = (x, y)</math></li> <li>10. Set <math>e = (-\text{int}(z)) \% n</math></li> <li>11. Set <math>\text{PublicKey} = (R*s + G*e) * \text{modinv}(r, n)</math></li> <li>12. If <math>\text{is\_even}(y)</math>, compute <math>\text{EncodedPublicKey} = "02" \parallel \text{hex}(x)</math>. Else, compute <math>\text{EncodedPublicKey} = "03" \parallel \text{hex}(x)</math></li> <li>13. Compute <math>\text{AddressHash} = \text{RIPEMD160}(\text{SHA256}(\text{EncodedPublicKey}))</math></li> <li>14. Compute <math>\text{DerivedAddress} = \text{Bech32}("bc", 0, \text{AddressHash})</math></li> <li>15. If <math>\text{DerivedAddress} == \text{Address}</math>, succeed verification. Else fail verification with an error similar to "Wrong address for signature".</li> </ol> <p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p> <p>The hash value <math>e</math> (e.g., <math>e</math>) is computed from the message <math>M</math> using the formula <math>e = (-\text{int}(z)) \% n</math>, where <math>z</math> is the hash value of the message (e.g., SHA256), as shown below.</p>



Claim 1	Exemplary Evidence of Infringement
	<p><b>ECDSA verification, P2WPKH compressed address</b></p> <ol style="list-style-type: none"> <li>1. Set <math>r = \text{DecodedSignature}[1:33]</math>. If <math>r \geq n</math> or <math>r == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>2. Set <math>s = \text{DecodedSignature}[33:65]</math>. If <math>s \geq n</math> or <math>s == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>3. Set <math>z = \text{SHA256}(\text{Message})</math></li> <li>4. Set <math>\text{recID} = \text{Header AND } 0x3</math></li> <li>5. If <math>\text{recID AND } 0x2 == 0</math>, set <math>x = r</math>, else set <math>x = r+n</math>.</li> <li>6. Set <math>x = (x^3 + 7) \bmod p</math></li> <li>7. Set <math>y = x^{(p+1)/4} \bmod p</math></li> <li>8. Calculate the correct parity of <math>y</math> using the 'recID': <ul style="list-style-type: none"> <li>• If <math>(\text{is\_even}(\text{beta}) \text{ and } \text{is\_odd}(\text{recID}))</math> or <math>(\text{is\_odd}(\text{beta}) \text{ and } \text{is\_even}(\text{recID}))</math>, set <math>y = p-y</math>.</li> </ul> </li> <li>9. Set <math>R = (x, y)</math></li> <li>10. Set <math>e = (-\text{int}(z)) \% n</math></li> <li>11. Set <math>\text{PublicKey} = (R*s + G*e) * \text{modinv}(r, n)</math></li> <li>12. If <math>\text{is\_even}(y)</math>, compute <math>\text{EncodedPublicKey} = "02"    \text{hex}(x)</math>. Else, compute <math>\text{EncodedPublicKey} = "03"    \text{hex}(x)</math></li> <li>13. Compute <math>\text{AddressHash} = \text{RIPEMD160}(\text{SHA256}(\text{EncodedPublicKey}))</math></li> <li>14. Compute <math>\text{DerivedAddress} = \text{Bech32}("bc", 0, \text{AddressHash})</math></li> <li>15. If <math>\text{DerivedAddress} == \text{Address}</math>, succeed verification. Else fail verification with an error similar to "Wrong address for signature".</li> </ol> <p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p> <p>The elliptic curve point comprises a first elliptic curve point <math>R</math>, the public key of the signer comprises a second elliptic curve point <math>Q</math>, and generating the public key of the signer comprises computing <math>Q=r-1(sR-eG)</math>, and <math>G</math> comprises a generator of an elliptic curve group that includes the first elliptic curve point <math>R</math> and the second elliptic curve point <math>Q</math>. The above equation is used to determine <math>Q</math>, which is the <math>\text{PublicKey}</math> (a point on the elliptic curve <math>\text{secp256k1}</math>). See, e.g.:</p> <p><b>Constants</b></p> <p>The constant <math>\text{Inf}</math> shall refer to the point at infinity, of the <math>\text{secp256k1}</math> curve.</p> <p>The constant <math>p</math> shall refer to the <math>\text{secp256k1}</math> field size, aka. curve characteristic, defined as <math>\text{int}(\text{FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF})</math></p> <p>The constant <math>n</math> shall refer to the <math>\text{secp256k1}</math> curve order, defined as <math>\text{int}(\text{FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF BAAEDCE6 AF48A03B BFD25E8C D0364141})</math></p> <p>The constant <math>G</math> shall refer to the <math>\text{secp256k1}</math> generator point, defined as <math>(79BE667E F9DCBBAC 55A06295 CE870B07 029BFCDB 2DCE28D9 59F2815B 16F81798, 483ADA77 26A3C465 5DA4FBFC 0E1108A8 FD17B448 A6855419 9C47D08F FB10D4B8)</math></p>

Claim 1	Exemplary Evidence of Infringement
	<p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p>
<p><b>1[d]</b> verifying, by the hardware processor of the computing device, the received signature using the recovered public key which provides an accelerated verification of the received signature.</p>	<p>MARA's miners verify that the second elliptic curve point Q represents the public key of the signer. See, e.g.:</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p><b>ECDSA verification, P2WPKH compressed address</b></p> <ol style="list-style-type: none"> <li>1. Set <math>r = \text{DecodedSignature}[1:33]</math>. If <math>r \geq n</math> or <math>r == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>2. Set <math>s = \text{DecodedSignature}[33:65]</math>. If <math>s \geq n</math> or <math>s == 0</math>, fail verification with an error similar to "Invalid ECDSA signature parameters".</li> <li>3. Set <math>z = \text{SHA256}(\text{Message})</math></li> <li>4. Set <math>\text{recID} = \text{Header AND } 0x3</math></li> <li>5. If <math>\text{recID AND } 0x2 == 0</math>, set <math>x = r</math>, else set <math>x = r+n</math>.</li> <li>6. Set <math>x = (x^3 + 7) \bmod p</math></li> <li>7. Set <math>y = x^{(p+1)/4} \bmod p</math></li> <li>8. Calculate the correct parity of <math>y</math> using the 'recID': <ul style="list-style-type: none"> <li>• If <math>(\text{is\_even}(\text{beta}) \text{ and } \text{is\_odd}(\text{recID}))</math> or <math>(\text{is\_odd}(\text{beta}) \text{ and } \text{is\_even}(\text{recID}))</math>, set <math>y = p-y</math>.</li> </ul> </li> <li>9. Set <math>R = (x, y)</math></li> <li>10. Set <math>e = (-\text{int}(z)) \% n</math></li> <li>11. Set <math>\text{PublicKey} = (R*s + G*e) * \text{modinv}(r, n)</math></li> <li>12. If <math>\text{is\_even}(y)</math>, compute <math>\text{EncodedPublicKey} = "02" \parallel \text{hex}(x)</math>. Else, compute <math>\text{EncodedPublicKey} = "03" \parallel \text{hex}(x)</math></li> <li>13. Compute <math>\text{AddressHash} = \text{RIPEMD160}(\text{SHA256}(\text{EncodedPublicKey}))</math></li> <li>14. Compute <math>\text{DerivedAddress} = \text{Bech32}("bc", 0, \text{AddressHash})</math></li> <li>15. If <math>\text{DerivedAddress} == \text{Address}</math>, succeed verification. Else fail verification with an error similar to "Wrong address for signature".</li> </ol> </div> <p>See, e.g., Message signing, <a href="https://en.bitcoin.it/wiki/Message_signing">https://en.bitcoin.it/wiki/Message_signing</a>.</p>